BAF Commissioning Issues

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1 Proposed Coupled Injection Setup

1. Inject with Q_H and Q_V below 4.5.
2. Set uncoupled tunes $Q_H = Q_0 - 0.01$ and $Q_V = Q_0 + 0.01$, where $Q_0 = 4 + 13/30 = 4.433333$. This is the red dot near the $Q_H - Q_V = 0$ resonance line in Figure 1.
3. Adjust skew quadrupole current so that the normal-mode tunes are $Q_1 = 4 + 6/15$ and $Q_2 = 4 + 7/15$ (i.e. $Q_1 = 4.4$ and $Q_2 = 4.466667$).
4. After accumulating beam with the coupling, the uncoupled tunes must be moved rapidly to the second red dot shown in Figure 1. Here $Q_H = 4.38$ and $Q_V = 4.55$. This requires correcting the $Q_V = 4.5$ resonance and possibly the $Q_H + Q_V = 9$ and $3Q_H = 13$ resonances.
5. Modeling this setup gives injection efficiencies comparable to those obtained with the gold setup.

2 Operating Point During Acceleration

1. Proposed operating point during acceleration is $Q_H = 4.38$ and $Q_V = 4.55$ as indicated by the red dot in Figure 1.
2. Will any of the nearby resonances ($Q_V = 4.5$, $Q_H + Q_V = 9$ or $3Q_H = 13$) become a problem as the quadrupole iron begins to saturate at high field?
3. Is Q_H sufficiently far from the $3Q_H = 13$ resonance prior to extraction?

4. The immediate plan is to see whether or not we can inject and accelerate protons with the tunes at the two points indicated by red dots in Figure 1. This will be done as a study at low intensity on User 4.

3 Bump Magnet "Overlap"

1. The BAF SEB bumps use the flat trim windings on dipoles C7, D1, D4, D7, E1. Each of these windings is to be connected to its own ± 600 A power supply.

2. During proton operation, the flat trim winding on one of these dipoles, D1, is used along with the windings on dipoles C4 and C8 to produce the so-called Slow Injection Bump at the H-minus injection foil. At present, the D1 winding is connected to a ± 50 A power supply for this purpose. For BAF operation, the ± 50 A supply needs to be disconnected and the ± 600 A supply needs to be connected in its place. One way to avoid having to switch power supplies when going back and forth between proton and BAF operation would be to use the ± 600 A supply for both modes of operation. This will work provided the ± 600 A supply can regulate sufficiently well at the low currents required for the Slow Injection Bump. Another option would be to connect the ± 50 A supply to two turns of the low-current winding on the dipole. This will work provided the low-current turns can carry 50 A. (Eight of the ten low-current turns are connected to the eddy current correction winding on the vacuum chamber. The remaining two are used as a monitor winding, but presumably could be taken out of the monitor system and used for the slow injection bump.)

3. The flat trim winding of dipole C4, used for the Slow Injection Bump, is also used to produce the new B6 Dump Bump. The dump bump is produced by the windings on dipoles A7, B2, C1, and C4. These are connected in series to a single bipolar power supply. At present, the plan is to float the ± 50 A supply across the C4 winding in the series string. Another option would be to connect the ± 50 A supply to two turns of the low-current winding as discussed above.

4 EMF Induced in Sextupole Correction Strings

1. Drive sextupoles SHC8, SHF8, SHB4, SHE4 are part of the SHSTR2, SHSTR4, SHSTR3, SHSTR1 sextupole corrector strings respectively.

2. Do the power supplies for these strings have enough voltage to cancel the EMF induced by the main windings?

3. See the document "Notes on the Acceleration of Iron Ions for the Booster Applications Facility" for details.

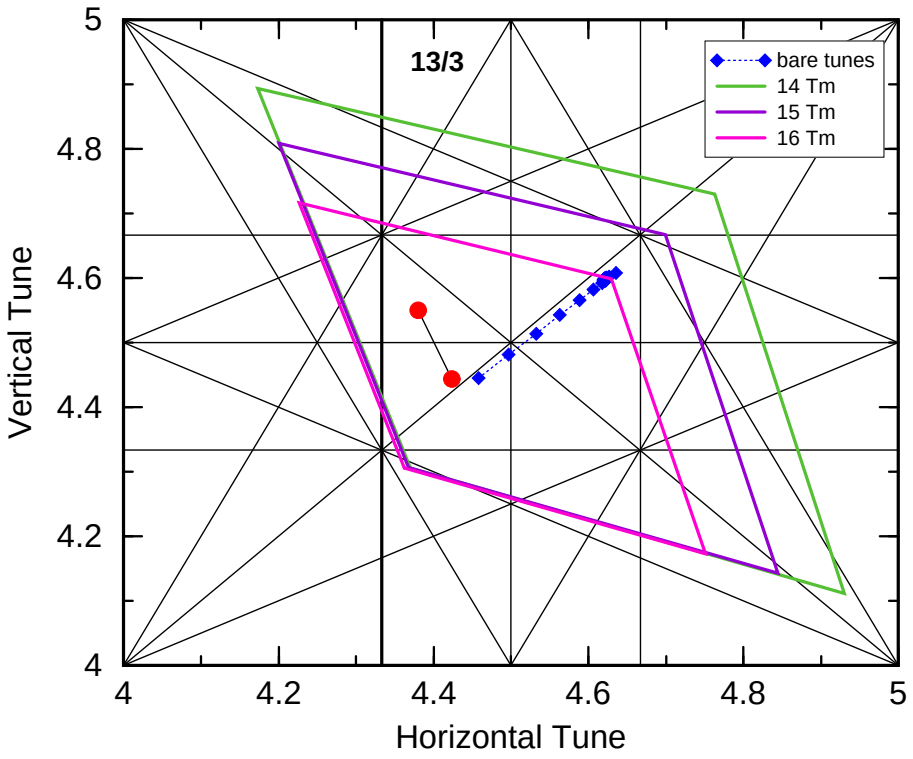

Figure 1: Tune Manipulation at Injection